1,059,067

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,059,067

Date of Application and filing Complete Specification: Oct. 6, 1965.

No. 42365/65.

Application made in Sweden (No. 11977) on Oct. 6, 1964.

Complete Specification Published: Feb. 15, 1967.

Index at acceptance:—H2 E(3A6A, 3A11B, 3A12, 3A15, 3B6); B4 W6E; F2 G(4D, 27)

Int. Cl.:—H 01 r 13/64 // A 47 f, F 16 l

COMPLETE SPECIFICATION

Improvements in Connecting Joints and Setting Tools for the Joints

I, NILS INGVAR NODFELT, of Jarnvagsgatan 76, Gnosjo, Sweden, a Swedish Subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to improvements in connecting joints, especially joints for connecting electric cables but also joints for making connections in hydraulic or pneumatic lines.

It is usually desirable for a joint to include means for preventing undesirable interchange between them.

Connecting joints designed to prevent interchange between them are already known but suffer from certain disadvantages. These known types of connecting joints are either inconvenient to handle or easily damaged. Further, the members designed to prevent interchangeability can easily be reset with the aid of common tools such as screw drivers, awls or the like and are therefore not proof against interchangeability. There are therefore no satisfactory guards against undesired interchange of the parts. Still further, the hitherto known types of joints are very sensitive to dirt or mechanical damage and in certain designs the members for preventing interchangeability may therefore become inoperative so that parts of the joint not intended to cooperate with each other may be interconnected, or alternatively interconnection of the proper parts may be prevented.

An object of the present invention is to provide a joint and setting tools in which one or more of these disadvantages is reduced.

Preferably the connecting joint has small external dimensions both as regards width and length relative to its capacity. A great number of connecting positions in a joint of small diameter is often desirable with the members arranged for preventing interchangeability so that they cannot be reset except by means of a special tool.

The invention consists in a connecting joint comprising a pair of connecting units, each unit including a body member having a number of fixed, irregularly spaced axially extending fingers separated by notches adapted to interengage with the notches and fingers respectively on the body of the other connecting unit, each unit also having a sleeve adapted to be locked in various angular positions and likewise having similar irregularly spaced, axially extending fingers and notches adapted to interengage with corresponding notches and fingers respectively in the sleeve similarly rotatable in the other unit, the said sleeves serving to prevent inadvertent interchange.

In a preferred form of the invention the sleeve of each connecting unit is adapted and disposed to encircle or be encircled by a portion of a cylindrical body member in which the axially extending fingers and notches are formed and in which is provided a peripheral groove for receiving a resilient locking ring adapted to engage alternatively in one or the other of two axially separated grooves in the sleeve which determine two chosen axial positions of the sleeve, the said sleeve being freely rotatable for adjustment in one of the said axial positions and being locked in a chosen angular position in the other of said positions. The sleeve of each interconnecting unit is provided at the end remote from the fingers with preferably evenly spaced slots adapted to engage with at least one locking pin on the main body member when the sleeve is in a locking position.

Preferably peripherally extending slots are provided in at least two preferably diametrically opposed fingers of the axial sleeve of each unit, the said slots having an axial dimension less than half the axial length of the fingers and being adapted to receive hook-like portions of a setting tool for altering the angular

[*Price 4s. 6d.*]

and axial positions of the sleeve. For setting these sleeves a substantially sleeve-shaped tool may be used having at least one end thereof provided with notches and axially extended fingers corresponding to those of the said adjustable sleeves, the said fingers having hook-shaped portions adapted to be brought into engagement with slots in the axially extending fingers of the adjustable sleeves.

A suitable form of the invention for connecting electric cables is described in the following with reference to the accompanying drawings in which:

Figures 1 and 2 show in perspective and partial section both of the connecting units of a joint;

Figure 3 shows on a considerably larger scale an axial section of a portion of the connecting unit shown in Figure 1 and;

Figure 4 is a side view of a tool for setting the relative positions of certain members in the respective units.

The joint illustrated in the drawings comprises a pair of connecting units 1 and 2, each having a substantially sleeve-shaped body member 3 and 4 respectively, the adjacent ends of which are provided with axially directed, preferably irregularly spaced fingers 5 separated by notches 6, the fingers of one of the body members being adapted to enter the notches of the other body member when the two body members assume certain angular positions relative to each other. Each of the body members 3 and 4 of the connecting units 1 and 2 of a joint for connecting electric cables is provided with a cylindrical central body or core 7 and 8 respectively of dielectric material and has axially extending bores in which are located plugs and sleeve-shaped sockets forming the connecting means. The core 7 of the connecting unit 1 is provided with six plugs 9 and a socket 10 while the core 8 of the connecting unit 2 is provided in a similar manner with six sockets 10 and a single plug 9. Each of the cores 7 and 8 is fixed in a certain angular position respective to its corresponding body member 3 and 4, for example by means of a radially extending pin on each core which engages a slot in the corresponding body member so that the various plugs will fit into their corresponding sockets when the connecting units are interconnected. Each of the core 7 and 8 is provided with an external flange 7*a* and 8*a* respectively at its rear end, i.e. that end at which the electric cable (not shown in the drawings) is connected. This flange is, as shown, held against the adjacent end of the corresponding body member 3 and 4 respectively by a retaining ring 11 having an internal flange which, when the retaining ring is mounted on its body members engages the rear side of one of flanges 7*a* or 8*a* either directly or through an interposed resilient ring 12. The retaining ring 11 serves to retain the respective cores 7 or 8 and is internally and externally threaded, the internal threads engaging corresponding external threads at the flanged ends of the cores 7 or 8.

The body member 3 or 4 of each connecting unit is provided with an external flange 3*a* or 4*a* respectively, there being a sleeve 13 or 14 respectively mounted on the forward end of each of the body members, these sleeves having axially extending, irregularly spaced fingers spaced apart by notches as on the body members 3 and 4, the fingers of each sleeve being adapted to enter the corresponding notches of the other body member when the body members are in a certain angular position relative each other. Each of the sleeves 13 and 14 is provided at the end adjacent the external flanges 3*a* and 4*a* respectively of the respective body members with evenly spaced, closely located slots 13*a* and 14*a* respectively which, as shown in the drawings, are adapted to be engaged by a radially extending locking pin 15 on the body member when the sleeves 13 and 14 are in the positions shown in Figures 1 and 2.

In these positions the sleeves 13 and 14 are thus fixed with their fingers and interposed notches in a definite angular position relative to the fingers and notches of the opposite body member. The sleeves 13 and 14 can, however, be shifted axially against the action of a resilient locking ring 16 located in an external peripheral groove in the respective body and engaging alternatively with one part of a corresponding peripheral double groove 17 in the respective sleeve 13 and 14. The groove 17 is divided into two parts by a circular ridge 18 at the middle thereof serving to compress the locking ring 16 and cause it to snap into place in one of the parts of the groove 17 when the sleeve is shifted. When one of the sleeves 13 has been moved to the axial position shown in Figure 3 the lock pin 15 is disengaged from the corresponding slot in the sleeve whereby the latter is free to be rotated so that it can be set to any position corresponding to one of the said slots, after which it may be again locked in the desired position by axially shifting it towards the external flange 3*a* or 4*a* respectively of the corresponding body member 3 or 4 so that the locking pin 15 is brought into engagement with the selected slot of the sleeve.

Peripherally directed slots 13*b* and 14*b* are provided in the fingers 5 of each sleeve 13 or 14 at preferably two diametrically opposed positions in which hook-like portions of a tool can be made to engage for changing the axial and angular positions of the sleeves. A tool 19 for this purpose is illustrated in Figure 4. This tool consists mainly of two sleeves 20 and 21 arranged telescopically one within the other, the outer of which 20 is provided at its end portions with axial fingers 20*a* separated by notches corresponding to the notches and fingers of the respective sleeves 13 and

14. The fingers of the outer sleeve 20 have hook-like portions 20*b* fitting into the slots 13*b* and 14*b* respectively of the sleeves 13 and 14 which can be brought into engagement in the said slots by introducing the fingers 20*a* into corresponding slots in the said sleeve and thereafter turning the outer tool portion 20 so that the hook-like portions 20*b* enter the slots 13*b*. The sleeve 13 or 14 can then be shifted to the position shown in Figure 3 by pulling the outer portion 20 of the tool 19 axially against the resilient action of the locking ring 16, after which the sleeve can be turned to the desired new angular position and then returned to the axial position shown in Figures 1 and 2 by exerting an axial force on the said portion of the tool 19.

To facilitate the setting of the sleeves 13 and 14 to the desired angular positions the tool 19 may, as mentioned, be provided with an inner member 21 disposed within the outer member 20 and having both its ends provided with notches and axial fingers 21*a* corresponding to the fingers 5 and notches 6 of the body members 3 and 4. This inner member is further provided with a scale having indicating marks located around the circumference thereof and visible through openings 20*c* in the outer tool portion 20. The graduations correspond to the spacing of the slots 13*a* and 14*a* of the sleeves 13 and 14 respectively. When using the tool the fingers are, as mentioned, introduced into the notches of one of the body members 3 or 4, after which the angular position of the sleeve may be adjusted when it has been freed from the locking pin 15 by turning the outer tool portion 20 until the desired indicating mark is visible through the opening 20*c* in the outer tool portion. The sleeve is then again shifted axially into engagement with the locking pin 15.

As is apparent from the above both units of the joint are substantially the same as regards the parts described above but since there are considerable differences in other parts they will be described separately in the following.

The connecting unit 1 is, as shown in the drawings, provided with a mantle 22 which entirely encircles the sleeve 13 and also to a substantial degree the body member 3. The mantle 22 which, as will be described later, is also intended to form a portion of the connecting means of the joint, is provided at its rear end with an internal flange 22*a* which is held in abutment against the rear face of the flange 3*a* of the body member 3 by the retaining ring 11 through a mounting flange 23 clamped between the mantle 22 and the retaining ring 11. The opening in the mounting flange 23 and that of the flange 22*a* of the mantle 22 is non-circular and the rear end portion of the body member 3 is of corresponding non-circular section so that both the mounting flange and the mantle 22 will be fixed in definite angular positions relative the body member 3 when the retaining ring 1 is screwed home.

To prevent water from leaking into the joint a sealing ring 24 is located in an internal circular groove in the mounting flange 23 and contacts the mounting flange 23, the body member 3 and the mantle 22. Further, the body member 3 has a peripheral groove opposite the front end portion of the core 7 in which is located a wide sealing ring 25 which also sealingly engages the front end of the core 8 of the other connecting unit 2 when the units are inter-conntected.

The other connecting unit 2 is in a manner similar to unit 1 provided with a mantle 26 which encircles the sleeve 14 as well as a substantial portion of the body member 4. The internal diameter of this mantle is, however, greater than the outer diameter of the mantle 22 and is so formed that when the units are connected it encircles the said mantle 22 of the connecting unit 1, for which purpose an annular space is provided for receiving the mantle 22 between the outer mantle 26 of the connecting unit 2 and the sleeve 14. The mantle 26 of the other connecting unit is provided at its rear end with an internal flange 26*a* which abuts against the rear face of the external flange 4*a* of the body member 4. In the face of the mantle 26 remote from the flange 4*a* are provided one or more recesses or ridges (not shown) which are adapted to be brought into engagement with corresponding ridges or recesses (not shown) in a stop ring 27 engaging this face of the flange 26*a*. This ring is urged to engage resiliently the flange 26*a* by a resilient ring 28 interposed between the ring 27 and the retaining ring 11 whereby the ring 27 forms a snap member by means of which the mantle 26 is disengageably held in required angular position relative to the body member 4.

The mantle 26 of the connecting unit 2, as is apparent from Figure 2, comprises two parts rigidly united by rivets 29, the forward part preferably being made of steel so as better to withstand mechanical damage. The mantle 22 of the first connecting unit 1 may also similarly be made of steel. The mantle 22 is provided with three suitably equi-distantly spaced external helical grooves 30 one end of which extends to the front edge of the mantle 22 and at the other end merges with a straight groove portion. The heads of the rivets 29 which project inwardly from the mantle 26 of the other connecting unit 2 enter these grooves so that by turning the mantle 26 relative to the unit 2 the units may be interconnected when the sleeves 13 and 14 are in proper relative positions therefor. The mantle 26 is for this purpose turned from a snap position as determined by the stop ring 27 in which the heads of the rivets 29 enter the openings of the grooves 30 at the front end of the mantle 22 to another snap position in which they are lo-

cated in the straight portions of the grooves 30. Because the mantle 26 is fixed in this angular position through the stop ring 27 the two connecting units cannot be inadvertently separated through vibration, axial forces or other mechanical forces. In order to separate them it is necessary first to turn the mantle 26 against the snapping action of the ring 27.

The body members 3 and 4, which may be identical, can form the fundamental units of most of the various connecting means available on the market. It is thus possible to provide the body members with either short or long cores which in turn may be provided with either socket or plug attachments or both socket and plug attachments as required. Further the body members may be provided with either quadrilateral or round mounting flanges, or the flange may be omitted when the connecting unit is used for cennecting cables. The body members may be provided with other types of connecting members instead of the bayonet-type locking means shown, e.g. of either threaded or push-pull type. It is also possible to use cores for different angular turning conditions relative to the body members so that hereby and in combination with the structure described above a great number of different non-interchangeable connecting joints may be provided.

As is apparent from the above the invention is not limited to the forms described in connection with the drawings but may be varied in various ways within the scope of the invention as defined in the appended claims.

WHAT I CLAIM IS:—

1. A connecting joint comprising a pair of connecting units, each unit including a body member having a number of fixed, irregularly spaced axially extending fingers separated by notches adapted to interengage with the notches and fingers respectively on the body of the other connecting unit, each unit also having a sleeve adapted to be locked in various angular positions and likewise having similar irregularly spaced, axially extending fingers and notches adapted to interengage with corresponding notches and fingers respectively in the sleeve similarly rotatable in the other unit, the said sleeves serving to prevent inadvertent interchange.

2. A connecting joint according to Claim 1, wherein the sleeve and body member of each of the connecting units are cylindrical, the body member being provided with a peripheral groove for receiving a resilient locking ring adapted to engage alternatively in one or the other of two axially separated grooves in the sleeve which determine two chosen axial positions of the sleeve, the said sleeve being axially rotatable for adjustment in one of said axial positions and being locked in a chosen angular position in the other of said axial positions.

3. A connecting joint according to either Claim 1 or Claim 2, wherein the sleeve of each connecting unit is provided at the end remote from the fingers with preferably evenly spaced slots adapted to engage with at least one locking pin on the body member when the sleeve is in a locking position.

4. A connecting joint according to any one of the preceding Claims wherein peripherally extending slots are provided in at least two preferably diametrically opposed fingers of the sleeve of each unit, the said slots having an axial demension less than half the axial length of the fingers and being adapted to receive hook-like portions of a setting tool for setting the angular and axial positions of the sleeve.

5. A connecting joint according to any one of Claims 1 to 4 for connecting electric cables, wherein each of the connecting units includes a core of dielectric material in which a number of contact members for the cables is provided.

6. A connecting joint according to Claim 5, wherein the contact members in the core of one of the connecting units consist of plugs and/or sockets and that the contact members of the other connecting unit consist of corresponding sockets and/or plugs.

7. A connecting joint according to Claim 5 or Claim 6, wherein each core is provided with a pin or the like in the body member of the respective connecting unit, the said body member encircling the said core.

8. A connecting joint according to Claim 7, wherein each core is provided with an external flange one face of which is adapted to abut against the rear end of the respective body member, the said body member having threads for threaded engagement with a retaining ring for screwing the latter towards the opposite face of the said flange of the core.

9. A connecting joint according to either of Claims 7 and 8, wherein the core of one of the connecting units is shorter than that of the other connecting unit, the latter core extending somewhat beyond the fingers of both the body member and of the corresponding sleeve.

10. A connecting joint according to Claim 9, wherein the tubular body member of the connecting unit having the shorter core is provided with an internal circular groove for receiving a sealing ring adapted to contact sealingly with the end portions of both cores when the connecting units are interconnected.

11. A connecting joint according to Claim 9, wherein the sockets and/or plugs comprising the connecting means of the longer core are located entirely within the core.

12. A connecting joint according to any one of the preceding Claims, wherein each of the connecting units has a mantle enclosing both the fixed fingers and those on the sleeve, the said mantles being adapted to assume positions telescopically one within the other when the joint is connected, both said mantles having connecting means, e.g. a bayonet joint, threaded connection, or the like.

13. A connecting joint according to Claim

12, wherein the [illegible]tle adapted to enter into the other mantle is fixedly connected to the body member of the connecting unit by a retaining ring, an external flange member and the said core and is formed in a manner to prevent relative rotation thereof.

14. A connecting joint according to Claim 13, wherein the outer mantle is provided with an internal flange adapted to engage with the rear face of an external flange on the body member, the opposite face of the said internal flange being adapted to abut directly or indirectly against a retaining ring surrounding the body member.

15. A connecting joint according to Claim 14, wherein the face of the internal flange of the mantle remote from the external flange on the body member is provided with one or more recesses or projections adapted to cooperate with corresponding projections or recesses respectively in resilient or resiliently loaded annular snap member non-rotatably located between the said flange and the retaining ring.

16. A connecting joint according to Claim 13, wherein a mounting flange having a non-circular bore is adapted to be located on a correspondingly non-circular portion of the body member and clamped between the mantle and the retaining ring.

17. A connecting joint according to Claim 16, wherein the side of the mounting flange adjacent the mantle is provided with an annular groove opening into the bore for seating a sealing ring for sealing contact with the body member, the mantle and the mounting flange.

18. A connecting joint according to any one of the foregoing Claims, wherein the adjustable sleeves having the axially extending fingers and notches are substantially identical for both units.

19. A tool for adjusting the adjustable sleeves according to Claim 4, wherein at least one end thereof is provided with notches and axially extending fingers corresponding to those of the said adjustable sleeves, the said fingers having hook-like portions adapted to be brought into engagement with slots in the axially extending fingers of the adjustable sleeves.

20. A tool according to Claim 19, wherein a sleeve-shaped portion thereof encircles or is encircled by a further sleeve-shaped member having notches and fingers at at least one end thereof corresponding to the fingers and notches on the body member of the connectiong unit, both said members having indicating marks corresponding to predetermined relative angular positions thereof.

21. A tool according to Claim 20, wherein the outer of the sleeve members is provided with an opening and that the inner of the said sleeve members has peripherally located numerals or letters visible through the said opening.

22. A connecting joint substantially as hereinbefore described with reference to and as shown in Figures 1 to 3 of the accompanying drawings.

23. A tool for adjusting connecting joints substantially as hereinbefore described with reference to and as shown in Figure 4 of the accompanying drawings.

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Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press (Leamington) Ltd.—1967. Published by The Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

1059067 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

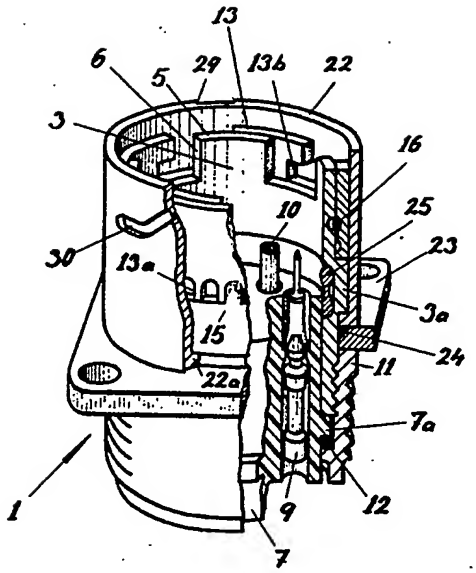

Fig. 1

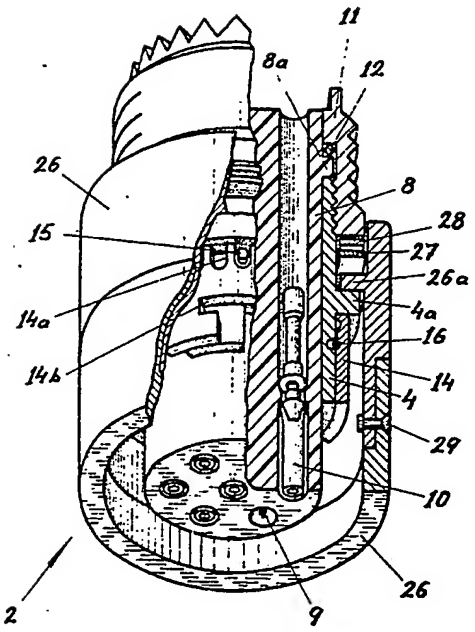

Fig. 2

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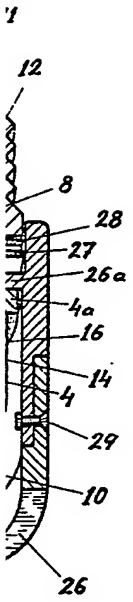
3 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 2 & 3



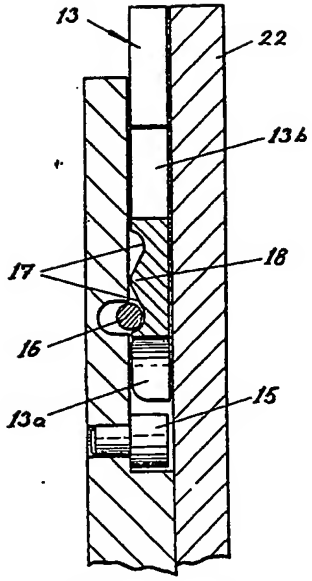


Fig. 3

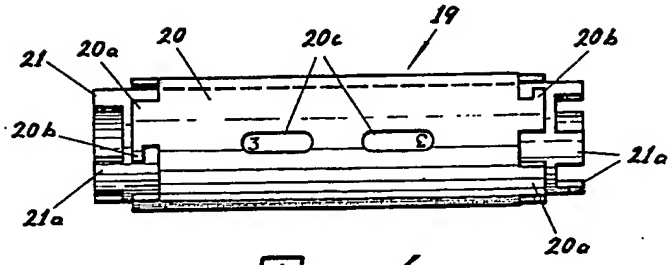


Fig. 4

1059067 COMPLETE SPECIFICATION
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Sheets 2 & 3

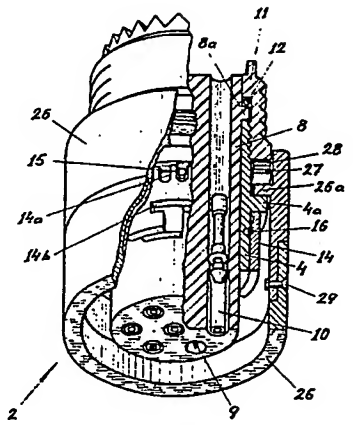

Fig. 2

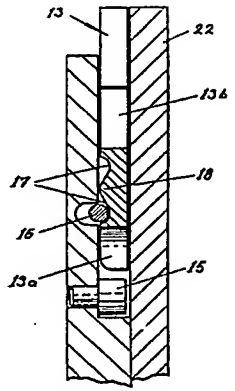

Fig. 3

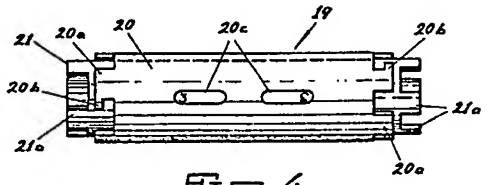

Fig. 4